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09/624,385	07/27/2000	Tatsushi Katayama	35.G2626	9572

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EXAMINER
WANG, JIN CHENG

ART UNIT	PAPER NUMBER
2672	

DATE MAILED: 03/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/624,385	KATAYAMA ET AL.	
	Examiner	Art Unit	
	Jin-Cheng Wang	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. The preliminary amendment filed on 03/05/2003 has been entered. Claims 1, 6, 11, 14, 18 and 22 have been amended. Claims 23-25 have been canceled.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Xiong et al. U.S. Patent No. 6,434,265.

3. Claim 1:

U.S. Pat. No. 6,434,265 to Xiong teaches an image synthesis method comprising:

A placement information obtaining step of obtaining placement information about a plurality of images in which adjacent images have a common subject region (e.g., in column 4, lines 5-40, Xiong teaches a method for constructing a panorama from rectilinear images in 3D through *projective registration and calibration* including: (1) the projective registrations of overlapping images, (2) calibration and global optimization of these images, a self calibration in which 2D image planes are positioned as 3D planes in space);

A setting step of setting one mapping mode out of a plurality of mapping modes each corresponding to a different mapping surface in accordance with said obtained placement information (e.g., in column 8, lines 18-58 of Xiong, it is stated that "overlapping photographs are analyzed to determine what orientation the photographs were taken in order to establish a common ground for subsequent operations and the panorama is constructed *on a particular geometry* that will *best* facilitate the rendering of the projection of the panorama onto *a chosen viewing plane* for viewing". The Xiong discloses some typical geometry on which panoramas are formed; In column 8, lines 18-58, Xiong further discloses that panorama is constructed on a particular geometry that will best facilitate the rendering of the projection *onto a chosen viewing plane* such as cubic, polyhedral, cylindrical and spherical geometries); and

A synthesis step of combining said plurality of images by using the mapping mode set in said setting step (e.g., in column 4, lines 5-40 of Xiong, it is stated that the composing or blending in which images are ready to be re-projected to a 3D environment map with pixels in overlap regions being composed from multiple; In column 8, lines 18-58, Xiong further teaches that overlapping photographs are analyzed to determine what orientation the photographs were taken in order to establish a common ground for subsequent operations and the panorama is constructed on a particular geometry that will best facilitate the rendering of the projection of the panorama onto a chosen viewing plane for viewing. The Xiong further discloses some typical geometry on which panoramas are formed).

- The Examiner interprets "a placement information obtaining step of obtaining placement information about a plurality of images in which adjacent images have a common subject

region" as an automatic registration and calibration step of registering the overlapping images and capturing common overlapping areas between overlapping images and minimizing the average squared pixel intensity difference with respect to certain transformation parameters.

- The Examiner interprets the mapping mode as mapping images onto a geometric surface such as a planar or a cylindrical surface (Applicant's specification, page 1, lines 20-25). Accordingly, the Examiner interprets the setting step of setting a mapping mode as the selecting step of selecting a geometric surface. In column 8, lines 18-58, Xiong discloses that panorama is constructed on a particular geometry that will best facilitate the rendering of the projection *onto a chosen viewing plane* (a geometric surface) such as cubic, polyhedral, cylindrical and spherical geometries. In column 4, lines 40-50, it is stated that "the projection module may be controlled through the user interface 230 as well, to allow a user to select what geometry will be projected onto". Therefore, Xiong teaches a selecting step of selecting a geometric surface out of a plurality of geometric surfaces each corresponding to a different mapping surface in accordance with the obtained placement information. As applied to the present application, Xiong fulfills the claimed limitation of a setting step of setting one mapping mode out of a plurality of mapping modes each corresponding to a different mapping surface in accordance with said obtained placement information.

Claim 2:

Claim 2 recites all the limitations of claim 1 and adds the limitation of "a focal length obtaining step." The Xiong reference teaches finding projective parameters such as 3D rotation parameters (pan, tilt roll), center of projection of images, ratio of focal lengths, and the like (column 10, lines 9-28). The Xiong reference implicitly teaches finding the camera internal parameters vector of which the focal length is a component (column 11, lines 15-42).

Claim 3:

The claim 3 recites all the limitations of claim 1 and adds the limitation of "a changing step of changing the mapping mode." The Xiong reference teaches that panorama is constructed on a particular geometry that will best facilitate the rendering of the projection onto a chosen viewing plane such as cubic, polyhedral, cylindrical and spherical geometries (column 8, lines 18-58).

Claim 4:

The claim 4 recites all the limitations of claim 1 and adds the limitation of "issuing a warning." The Xiong reference teaches in figures 2 and 3 a user interface and a global optimization that provides feedback to the computer system such as issuing warning messages on the computer monitor 218 when the pair-wise objective function is not desirable for a poor selection of the projection viewing plane (and the resulting panoramas will have imperfectly aligned images that give shadow or ghosting effects) due to a poor selection of the projection viewing plane. The resulting panoramas will have imperfectly aligned images that give shadow or ghosting effects. Nevertheless, the Xiong reference points to a seamless multi-resolution average blending method that would result in an absent of shadow effects (column 14, lines 1-45).

Claim 5:

The claim 5 recites all the limitations of claim 1 and adds the limitation of "a displaying step of displaying a cuttable rectangular region." The Xiong reference teaches how to align images more precisely by changing the coordinates for positioning an image. The Xiong reference further teaches placing the images 1210 at selected tangents on the viewing sphere 1220 (figure 12, and column 17, lines 12-65).

4. Claim 6:

The claim 6 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of "an image synthesis apparatus. However, Xiong et al. further discloses in figure 3 an apparatus for image synthesis.

Claim 7:

The claim 7 recites all the limitations of claim 6 and adds the limitation of "a focal length obtaining step." The Xiong reference teaches finding projective parameters such as 3D rotation parameters (pan, tilt roll), center of projection of images, ratio of focal lengths, and the like (column 10, lines 9-28). The Xiong reference implicitly teaches finding the camera internal parameters vector in his image synthesis apparatus of figure 3 because the focal length is a component of that vector (column 11, lines 15-42).

Claim 8:

The claim 8 recites all the limitations of claim 6 and adds the limitation of "a changing step of changing the mapping mode." The Xiong reference teaches that panorama is constructed on a particular geometry that will best facilitate the rendering of the projection of the panorama

onto a chosen viewing plane such as cubic, polyhedral, cylindrical and spherical geometries (column 8, lines 18-58).

Claim 9:

The claim 9 recites all the limitations of claim 8 and adds the limitation of "issuing a warning." The Xiong reference teaches in figures 2 and 3 a user interface and a global optimization that provides feedback to the computer system such as issuing warning messages on the computer monitor 218, e.g., when the pair-wise objective function is not desirable (and the resulting panoramas will have imperfectly aligned images that give shadow or ghosting effects) due to a poor selection of the projection viewing plane. The resulting panoramas will have imperfectly aligned images that give shadow or ghosting effects. Nevertheless, the Xiong reference points to a seamless multi-resolution average blending that is absent of shadow effects (column 14, lines 1-45).

Claim 10:

The claim 10 recites all the limitations of claim 8 and adds the limitation of "a displaying step of displaying a cuttable rectangular region." The Xiong reference teaches how to align images more precisely by changing the coordinates for positioning an image. The Xiong reference further teaches placing the images 1210 at selected tangents on the viewing sphere 1220 (figure 12, and column 17, lines 12-65).

5. Claim 11:

The claim 11 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of a computer-readable storage medium having a program for

implementing image synthesis method. However, Xiong et al. further discloses the claimed limitation of a computer-readable storage medium having a program for implementing image synthesis method (e.g., in column 3, lines 54-57, it is stated "a program residing in system memory 220 which stores output data and other data").

Claim 12:

The claim 12 recites all the limitations of claim 11 and adds "a focal length obtaining step." The Xiong reference teaches finding projective parameters such as 3D rotation parameters (pan, tilt roll), center of projection of images, ratio of focal lengths, and the like (column 10, lines 9-28). The Xiong reference implicitly teaches finding the camera internal parameters vector of which the focal length is a component (column 11, lines 15-42).

Claim 13:

The claim 13 recites all the limitations of claim 11 and adds the limitation of "a changing step of changing the mapping mode." The Xiong reference teaches that panorama is constructed on a particular geometry that will best facilitate the rendering of the projection of the panorama onto a chosen viewing plane such as one of the cubic, polyhedral, cylindrical and spherical geometries (column 8, lines 18-58).

6. Claim 14:

The claim 14 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of an image synthesis method comprising a generating step of generating coordinate-space transformation parameters. However, Xiong et al. further discloses the claimed limitation of a generating step of generating coordinate-space transformation

parameters (for example, in a local pair-wise registration, the estimation of parameters in a projective matrix which represents a coordinate transformation matrix; column 11, lines 1-46).

Claim 15:

The claim 15 recites all the limitations of claim 14 and adds the limitation of "a changing instruction step of issuing a mapping mode changing instructions." The Xiong reference teaches that panorama is constructed on a particular geometry that will best facilitate the rendering of the projection of the panorama onto a chosen viewing plane such as cubic, polyhedral, cylindrical and spherical geometries (column 8, lines 18-58). The Xiong reference further teaches calibration as the second major step in authoring panoramas to extract camera internal and external parameters from those projective matrices (column 12, lines 33-44). The Xiong reference discloses that the improved projective matrix parameters will in turn be used to generate improved estimation of camera parameters and blending may be further iterated after an initial blending (column 13, lines 53-67).

Claim 16:

The claim 16 recites an image synthesis method comprising a reference position-setting step. The Xiong reference teaches a multi-resolution weighted average blending for perspective alignment (column 14, lines 2-45). The Xiong reference also teaches for example in column 11 setting or estimating camera orientation and the rotation matrix that is based on camera orientation.

Claim 17:

The claim 17 recites all the limitations of claim 14 and adds the limitation of "a storage step of storing a generated panoramic synthesized image." The Xiong reference teaches

panoramic canvas which can be simply be a buffer or memory in a computer system such as memory 220 of figure 2 and onto which the blended images is copied (column 15, lines 15-28).

7. Claim 18:

The claim 18 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of an image synthesis apparatus comprising a generating means for generating coordinate-space transformation parameters and image synthesis means for combining the images. However, Xiong et al. further discloses the claimed limitation of an image synthesis apparatus comprising a generating means for generating coordinate-space transformation parameters and image synthesis means for combining the images (e.g., a pair-wise registration module 222 and the projection function module 228. The parameters in a projective matrix are estimated which represents an image coordinate transformation matrix. The projection function module 228 constructs a panoramic scene by projecting the blended image onto any designated geometry view surface; column 4, lines 21-52, and column 11, lines 1-46).

Claim 19:

The claim 19 recites all the limitations of claim 18 and adds the limitation of "a changing means for changing the mapping mode." The Xiong reference teaches a projection module 228 residing in memory 220 and operating the processor 212 may be controlled through the user interface 230 to allow a user to select what geometry will be projected onto (i.e., changing the mapping mode) and to control and modify other factors, including the use of photo re-touching software such as PhotoShop for modifying the final panorama (column 4, lines 41-49).

Claim 20:

The claim 20 recites all the limitations of claim 18 and adds the limitation of "a reference position setting means." The Xiong reference teaches for example in column 11 setting or estimating camera orientation on which the rotation matrix is based.

Claim 21:

The claim 21 recites all the limitations of claim 18 and adds the limitation of "storage means for storing a generated panoramic synthesized image, coordinate transformation parameters and coordinate-space transformation parameters." The Xiong reference teaches storage means such as panoramic canvas which can be simply a buffer or memory in a computer system such as memory 220 in figure 2 and onto which the blended images is copied (column 15, lines 15-28). The Xiong reference teaches that the improved projective matrix parameters (i.e., the coordinate and coordinate-space transformation parameters) can be used to generate improved estimation of camera parameters and blending may be further iterated after an initial blending (column 13, lines 53-67). Finally, the Xiong reference teaches projective parameters, e.g., 3D rotation parameters, center of projection of images, ratio of focal lengths, and an affine transformation in constructing a two-dimensional view of the environment (column 10, lines 16-28).

8. Claim 22:

The claim 22 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of a computer-readable storage medium having a program for implementing image synthesis method and a generating step of generating coordinate-space transformation parameters. However, Xiong et al. further discloses the claimed limitation of a computer-readable storage medium having a program for implementing image synthesis method

and a generating step of generating coordinate-space transformation parameters (e.g., a program residing in system memory 220 which stores output data and other data; column 3, lines 54-67. The Xiong reference also teaches in a local pair-wise registration the estimation of parameters in a projective matrix which represents a coordinate transformation matrix; column 11, lines 1-46. Finally, the Xiong reference teaches that the improved projective matrix parameters will in turn be used to generate improved estimation of camera parameters and blending may be further iterated after an initial blending; column 13, lines 53-67).

Remarks

9. Applicant's arguments, filed 03/05/2003, paper number 6, have been fully considered but they are not deemed to be persuasive.

10. Applicant argues in essence with respect to claim 1 and similar claims that:

> "In Xiong et al., an image is projected onto a predetermined surface for image synthesis, and the combined image is projected onto an arbitrary surface for image display. Therefore, in Xiong et al., the synthesized image is deteriorated by multiple projections. On the contrary, the method of Claim 1 makes it possible to decrease the number of unnecessary projections by providing flexibility in the projection at the time of image synthesis."

This is not found persuasive for the following reasons:

(a) Applicant's states that "In Xiong et al., an image is projected onto a predetermined surface for image synthesis". On contrary, Xiong teaches the projection of a panorama onto a particular 3D geometry (not a predetermined surface). In column 8, lines 19-67, it

is stated that "Authoring a panorama from 2D images can be thought of as divided into two different phases: (1) orientation of originally 2D images into 3D space, and (2) the projection of a panorama onto a particular 3D geometry, that can later be used to project views of the panorama onto a 2D viewing plane". Applicant further came to conclusion that "therefore, in Xiong et al., the synthesized image is deteriorated by multiple projections". This is not found persuasive since the projection onto a 3D geometry would not deteriorate a synthesized image because the panorama is constructed on a particular geometry that will best facilitate the subsequent step of the projection of the panorama from the particular geometry onto a chosen viewing plane for viewing by a user. Therefore, Xiong's teaching only involves one projection for mapping of the panorama from a 3D geometric geometry onto a 2D geometric surface.

11. Applicant argues in essence with respect to claim 1 and similar claims that:

"Nothing has been found in Xiong et al. that would teach or suggest setting one mapping mode out of a plurality of mapping modes, each corresponding to a different mapping surface, in accordance with obtained placement information about a plurality of images."

This is not found persuasive because of the following reasons:

- The Examiner interprets the mapping mode as mapping images onto a geometric surface such as a planar or a cylindrical surface (Applicant's specification, page 1, lines 20-25). Accordingly, the Examiner interprets the setting step of setting a mapping mode as the selecting step of selecting a geometric surface. In column 8, lines 18-58, Xiong discloses that panorama is constructed on a particular geometry that will best facilitate the

rendering of the projection *onto a chosen viewing plane* (a geometric surface) such as cubic, polyhedral, cylindrical and spherical geometries. In column 4, lines 40-50, it is stated that "the projection module may be controlled through the user interface 230 as well, to allow a user to select what geometry will be projected onto". Therefore, Xiong teaches a selecting step of selecting a geometric surface out of a plurality of geometric surfaces each corresponding to a different mapping surface in accordance with the obtained placement information. As applied to the present application, Xiong fulfills the claimed limitation of a setting step of setting one mapping mode out of a plurality of mapping modes each corresponding to a different mapping surface in accordance with said obtained placement information.

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (703) 605-1213. The examiner can normally be reached on 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-6606 for regular communications and (703) 308-6606 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 395-3900.

jcw
March 13, 2003

JEFFERY BRIER
PRIMARY EXAMINER